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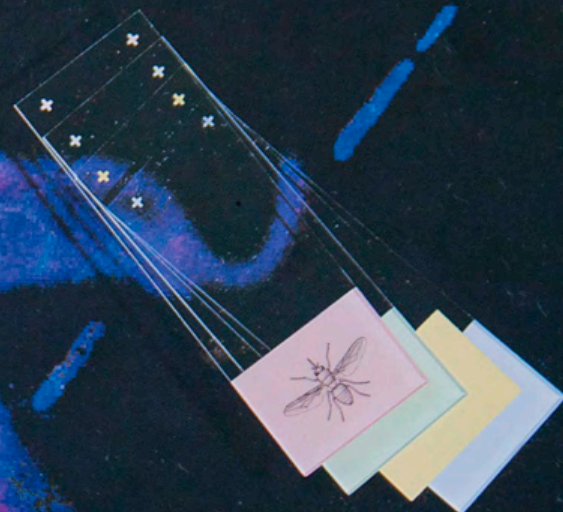
SMU Research

Southern Methodist University

Volume 10 Year 2003

Biological Building Blocks

New Facility, Scholars Enhance SMU's
Research Programs in the Biological Sciences



Celebrating 10 Years of SMU Research



SMU RESEARCH

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Office of Public Affairs

Editor Ellen Mayou
Designer Victoria Clary
Photographer Hillsman S. Jackson
Contributors Lisa Castello, Meredith Dickenson,
Kathy Tibbetts, Susan White
Associate Vice President for Public Affairs
Patricia Ann LaSalle

Office of Research and Graduate Studies

Contributors Barbara Phillips, Larry Smith

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Photography

Edward S. Curtis page 9
Debora Hunter page 7
Hillsman S. Jackson pages 12, 13, 18, 19, 21, 22, 25, 26
Byrd Williams cover and page 17

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This is the 10th volume of *SMU Research*. When the first volume came out in 1993, I wasn't sure whether even a second volume would be feasible. With the generous support of the Office of Public Affairs, *SMU Research* has become a regular publication of the University.

During the past 10 years, *SMU Research* has tried to give a broadbased overview of the research undertaken by the faculty at SMU. In selecting personalities and stories, we have covered both sponsored and nonsponsored research and disciplines as diverse as engineering, theology, and law. We have profiled researchers from all six schools and celebrated the research accomplishments of the entire faculty.

This volume comes on the heels of the completion of a successful capital campaign and the construction of two new buildings on campus that I believe will make a large contribution to the growth of research at SMU. The Dedman Life Sciences Building, completed just over a year ago, and the Jerry Junkins Electrical Engineering Building, inaugurated within the past year, provide faculty members in the departments of Biological Sciences and Electrical Engineering, respectively, with up-to-date facilities to conduct cutting-edge research in their disciplines. The impact of such facilities is already being seen in the appointments made in the Department of Biological Sciences, which you can read about in the cover article in this volume. I have no doubt that the Junkins Building will play an equally significant role in advancing research in the School of Engineering.

The cover article about our research in the biological sciences features researchers who are working on the frontiers of science, emphasizing state-of-the-art methods in protein structure, cell biology, and recombinant DNA techniques. Specific research topics include conversion of food into chemical energy to provide fuel for life, gene regulation, causes of aging, and the ability of disease-causing pathogens to take over functions of the host.

Two faculty members – Professor Radovan Kovacevic from Mechanical Engineering and Professor William Dillon from Marketing – also receive prominent mention in this issue. Professor Kovacevic directs a Research Center on Advanced Manufacturing and Professor Dillon conducts research on consumer behavior and product development while shouldering administrative responsibilities as associate dean for academic affairs in Cox School of Business.

A new item introduced this year is the "Scrapbook" page that highlights faculty and student research in the field. In areas such as archaeology and geology, fieldwork is an essential part of research.

I wish to thank all of you who have supported us in the past 10 years. I look forward to your continued support and encourage your interest in what we do in the coming years.

U. Narayan Bhat

Dean, Research and Graduate Studies

nbhat@mail.smu.edu

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On the cover Larry Ruben, chair of the Department of Biological Sciences at SMU, creates mutant versions of the microscopic parasite *Trypanosoma brucei* to try and find new mechanisms for killing the parasite. This mutant *Trypanosoma brucei* was photographed with a confocal microscope that allows researchers to identify individual proteins from among the 10,000 proteins in a cell. See page 19 to learn more about Ruben's research on *Trypanosoma brucei*.

This page and preceding page Details from etchings by Larry Scholder. See page 26 for more of Scholder's work.

research news



Bones and barnacles
can be used to tell
a chemical story
of the turtles' past.

Turtle Tracks

Research conducted by an SMU graduate student may help protect an endangered species.

Dana Biasatti, who studied the migration of ancient sea turtles for her Master's thesis in paleontology at SMU, tracked their movements by conducting chemical analyses of the turtles' bones as well as barnacles growing on their shells.

Because turtles incorporate elements from the environment into their bodies, Biasatti says bones and barnacles can be used to tell a chemical story of the turtles' past. Her research could help scientists better understand where turtles travel, as well as protect them from hazards such as toxic spills or overfishing.

Her research will be published this year in *Palaeogeography*, *Palaeoclimatology*, *Palaeoecology*. Biasatti plans to

continue her research on the correlation of marine animal skeletal chemistry with migration and ecology while pursuing a Ph.D. at Florida State University.

For more information: Dana Biasatti
biasatti@magnet.fsu.edu

Diversion Pays

Providing drug treatment to criminals is initially more expensive than simply sending them to jail. But could this additional expense be more cost-effective in the long run?

Yes, according to a study conducted by SMU researchers. The study found over a 40-month period, that every dollar spent on drug treatment resulted in \$9.43 in cost savings to society over traditional adjudication. The total savings over the 40-month follow-up period was \$14,771 per participant.

The research focused on par-

ticipants in a Dallas County program called DIVERT Court. The program, which was created in 1998, allows nonviolent drug offenders to opt for a rigorous 12- to 18-month rehabilitation program instead of going to prison. Drug arrest records of those who successfully complete the program are cleared.

The study, conducted by Professor Thomas Fomby and doctoral student Vasudha Rangaprasad from the Department of Economics, is a follow-up to a 2001 study conducted by SMU psychology graduate student Monica Turley and Ashley Sibley. The initial study, which focused on the recidivism rate of DIVERT Court participants, found that DIVERT graduates were half as likely to be re-arrested after successful treatment as individuals who dropped out of DIVERT, and one-third as likely to be arrested as drug users treated by traditional adjudication and jail time.

"Our results add to previously published literature that indicates drug court diversion constitutes a viable criminal justice alternative for many drug offenders," Fomby says.

The SMU study was submitted to the Texas Legislature and the Dallas County Commissioners' Court as argument for continued funding and possible expansion of the DIVERT Court program.

For more information: **Tom Fomby**
tfomby@mail.smu.edu

After the Judgment

In the past 25 years, a major shift has occurred in the way that tort law affects a plaintiff's life after the plaintiff wins a judgment from trial or from settlement.

Traditionally, plaintiffs received their judgment amounts in lump-sum payments. Now, a combination of developments – some legislative and some market-based – have resulted in a variety of "pay out" methods that affect the timing, duration, and control of the judgment monies. These methods include structured set-

tlements paid through annuities, mandatory periodic payments ordered by judges, and greater use of trusts.

The chosen option can greatly affect the plaintiff's life after a lawsuit. A structured settlement has tax advantages, but consists of payments that, once scheduled, cannot be altered in timing, duration, or amount. Trust provisions, such as those that exist in Texas, can place control over a minor's settlement in the hands of a third party, even after the minor reaches the age at which they can legally enter into binding contracts. Mandatory periodic payment schedules drafted by judges take away the plaintiff's right to access the money at intervals and in amounts the plaintiff chooses.

This shift, in turn, imposes new responsibilities on courts and plaintiffs' attorneys. Lawyers, for instance, now decide how much they should advise their clients about options other than lump-sum payments. Lawyers currently are divided about whether and how much they should advise clients to seek outside expertise.

Ellen Pryor, a professor in SMU's Dedman School of Law,

examines the issues surrounding this trend in an article published in the December 2002 issue of the *University of Virginia Law Review*.

"Lawyers who do not have the financial expertise to play out the numbers and articulate the options need to take the appropriate steps to make this expertise available to their clients," Pryor says. "But it should be up to the plaintiffs to make the final decision, just as plaintiffs should have the final say on whether they want to settle or go to trial."

For more information: **Ellen Pryor**
epryor@mail.smu.edu

Toddler Tales

Dealing with children during the "terrible twos" can try any parent's patience.

But parents who take time to provide explanations to their children and reach compromises during arguments can help their children's future socioemotional development, according to a study conducted by an SMU psychology professor.

Deborah Laible, assistant professor of psychology, studied the frequency and nature of conflicts between 63 mothers and their children when the children were 30 months old and again at 36 months old. Laible found that the way mothers resolved conflict with their toddlers at 30 months old could be a predictor of the children's later socioemotional development.

Laible found that "constructive conflict" involving high levels of negotiation, justification, and resolution was developmentally enhancing, while simply telling children to do things "because I told you so" was not effective in promoting the children's emotional and moral understanding.

"Children are learning communication patterns from these early conflicts with their parents that will transfer to arguments with siblings, peers, their own children, and romantic partners," Laible says.

Laible's research was published in the July/August 2002 issue of *Child Development*.

For more information: **Deborah Laible**
dlaible@mail.smu.edu

Preserved in Amber



SMU paleontologists obtained this image of a 15- to 20-million-year-old lizard preserved in amber using a high-resolution Computed Tomography (CT) scanner at UT Austin. The specimen, from the Dominican Republic, was donated to the Shuler Museum of Paleontology at SMU by Bill Lowe, a long-time supporter of paleontology programs in the Dallas area. Lowe discovered the specimen in a private collection of amber that was thought to contain only insect and plant inclusions. The SMU specimen is one of only about a dozen known specimens and is one of three that has been the subject of scientific study. SMU researchers used the CT scanner to digitally thin-section and then computer reconstruct a virtual 3D version of the fossil. Their research has shed new light on the evolution and life history of Anolis lizards, as well as the age of the Greater Antillean islands. It also is expected to lead to additional use of Computed Tomography to study vertebrate fossils preserved in amber. Complete findings of the SMU researchers can be found online at <http://palaeo-electronica.org>.

research news



Slaughteria's primitive pattern of tooth replacement offers the first glimpse of a system that may have been shared by the common ancestor of most modern mammals.

Dental Discovery

SMU researchers have discovered what the tooth fairy had to work with 100 million years ago. Their discovery sheds new light on how the tooth replacement system in modern mammals may have evolved.

In an article published in the *Proceedings of the Royal Society of London*, the authors describe how they found both a baby tooth and a replacement tooth in the jaw of a 110-million-year-old fossil mammal known as *Slaughteria eruptens*.

Slaughteria was a shrew-like mammal no larger than a small mouse. It is significant because it lived about the time when placental mammals and marsupials diverged from a common ancestor. Marsupials and placentals could have evolved from *Slaughteria*, or an animal like it.

Bob Slaughter, former director of the Shuler Museum of Paleontology at SMU, discovered the *Slaughteria* jaw on a farm in Wise County, Texas, in 1967.

Early examinations of the *Slaughteria* jaw did not reveal any replacement teeth. Using the high-resolution X-ray Computed Tomography Facility at The University of Texas at Austin, SMU researchers found a previously unrecognized replacement tooth hidden in the

middle of the lower jaw under a tooth once thought to be a permanent molar.

"It is rare to find any teeth on a jaw of fossils like this, and replacement teeth are even rarer," says Dale Winkler, current director of the Shuler Museum of Paleontology. Winkler co-authored the paper with Louis Jacobs, president of the Institute for the Study of Earth and Man at SMU, and Yoshitsugu Kobayashi of the Fukui Prefectural Dinosaur Museum in Japan. Kobayashi began the study while he was a graduate student at SMU.

To date, it has been unclear how the remarkably different systems of tooth replacement used by modern mammals (marsupials and placentals) developed, Winkler says. Marsupials replace only one milk tooth, whereas placentals replace more than one.

Slaughteria's primitive pattern of tooth replacement offers the first glimpse of a system that may have been shared by the common ancestor of most modern mammals.

Discovery of the replacement tooth in *Slaughteria* may prompt researchers to re-evaluate fossils of other mammals that have been found in the same Lower Cretaceous deposits in North Central Texas, Winkler adds.

For more information: Dale Winkler
dwinkler@mail.smu.edu

In the Matter of Strange Quarks

Physicists have suspected for about two decades that a very heavy form of matter known as "strange quark matter" might exist, but no one has yet found any evidence. Strange quark matter is so dense that a ton-sized nugget would be about the size of a red blood cell.

Two SMU professors believe they have found the first evidence of strange quark matter passing through Earth.

In a paper to be published in the *Bulletin of the Seismological Society of America*, Geological Sciences Professor Eugene Herrin and Physics Professor Vigdor Teplitz describe how they discovered evidence of strange quark matter. They searched through more than a million records of seismic events collected by the U.S. Geological Survey from 1990 to 1993 that were not associated with traditional seismic events such as earthquakes. These records of so-called "unassociated events" were collected from seismic stations set up around the world to monitor earthquakes and nuclear testing.

Strange quark matter has a distinct seismic signal — a straight line — caused by the large ratio of speed to the speed of sound in the Earth, Herrin says. He estimates that strange

quark matter might pass through the Earth at 250 miles per second, 40 times the speed of seismic waves.

Herrin found a seismic event that occurred on Nov. 24, 1993 that fit this unusual pattern. The event, which was recorded by nine monitoring stations in Australia and Bolivia, involved an object that entered the Earth south of Australia and exited the Earth near Antarctica 16.8 seconds later.

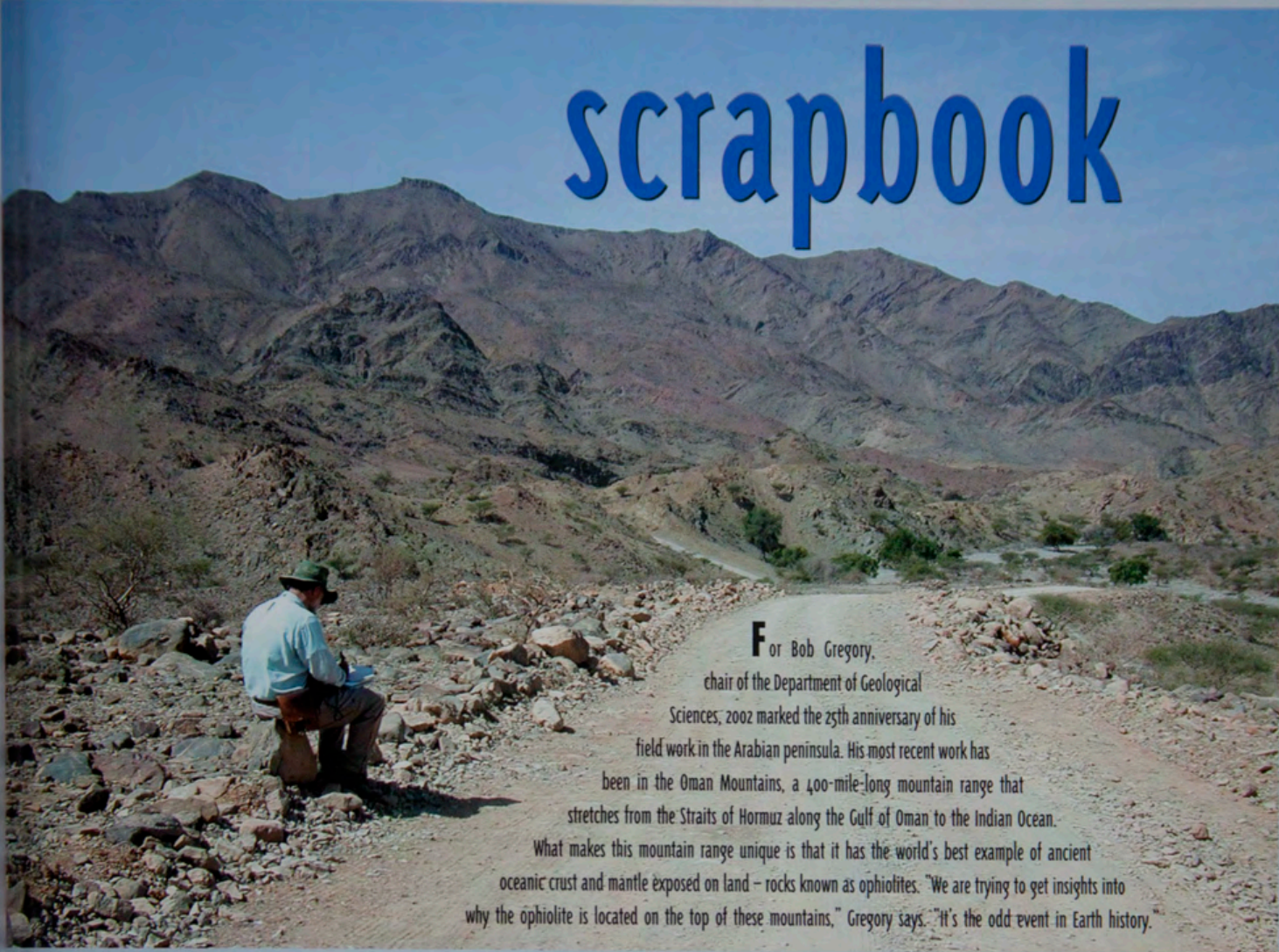
"We can't prove that this was strange quark matter, but that is the only explanation that has been offered so far," Herrin says.

For more information: Eugene Herrin
herrin@mail.smu.edu

Two SMU professors believe they have found the first evidence of strange quark matter passing through Earth.



scrapbook



For Bob Gregory, chair of the Department of Geological Sciences, 2002 marked the 25th anniversary of his field work in the Arabian peninsula. His most recent work has been in the Oman Mountains, a 400-mile-long mountain range that stretches from the Straits of Hormuz along the Gulf of Oman to the Indian Ocean. What makes this mountain range unique is that it has the world's best example of ancient oceanic crust and mantle exposed on land – rocks known as ophiolites. "We are trying to get insights into why the ophiolite is located on the top of these mountains," Gregory says. "It's the odd event in Earth history."

Paleontology graduate student Pete Rose took this photo while on a dinosaur fossil-hunting expedition last summer on Alaska's North Slope. Rose and Kent Newman (shown here along with Aaron Hawkins from the University of Alaska at Fairbanks) were among the members of a team that went to Alaska to look for bones from a horned dinosaur known as a *ceratopsian*. *Ceratopsian* had some of the largest skulls of any dinosaur known – as much as six feet long. "When we got there, we started turning up bones left and right," Rose says. "We found portions of at least eight different skulls." The initial attempt to lift this skull out by helicopter failed, but a team that included several members of the U.S. Army's Mt. McKinley high-altitude rescue division was finally able to help the researchers get the fossil to the University of Alaska Museum in Fairbanks, where it will remain for further study.



faculty profiles



Art That Travels Well

When Dallas Area Rapid Transit (DART) asked **Debora Hunter** five years ago to design the public art component — columns, paving patterns, and wind-screens — for its new commuter rail station at LBJ Freeway and Skillman Road, she was at a momentary loss for ideas. But Hunter, a photographer and artist who grew up in Chicago, is at once comfortable and familiar with an urban landscape, as well as public transportation via the Windy City's elevated train.

Drawing upon what she calls a “well-developed narrative capacity” as a photographer, as well as her background in liter-

ature that she obtained as an undergraduate at Northwestern University, Hunter envisioned a station platform that blends a literal interpretation of the transportation industry with presidential history. Hunter, associate professor of photography in Meadows School of the Arts, found inspiration in ordinary objects such as highway signage materials, tire treads, and roadway “buttons,” incorporating them into the design of the station.

The presidential history aspect was a given because of the freeway's LBJ namesake — she merely drew from materials about the 36th president of the United States Lyndon Baines Johnson and the first lady, Lady Bird Johnson, both Texas natives. Speeches and writings by both adorn some of the wind-screens made of reflective highway materials. The result —

witty and educational — has transformed a barren patch of land surrounded by warehouses and eight lanes of freeway into a pleasant oasis for harried urban commuters.

The experience also was educational for Hunter: She not only learned how to work with new materials that would remain durable outdoors, but also how to manage an art project that was restricted by public funding and construction deadlines. She accepted the challenge, she says, because “I wanted my children to see work I had done as an example of participation in our civic life outside the traditional venues of museums or art galleries.”

Since the completion of the rail station, Hunter has returned to a personal project that has occupied her attention for 11 years, calling it “the most complicated work I’ve done.”

During family road trips, Hunter photographs her husband and children in the car and the passing landscape outside. She pairs the two photos together to serve as a commentary on the American landscape and the family.

Hunter's photography has appeared in numerous solo and group exhibitions and has been acquired by the Dallas Museum of Art, the Art Institute of Chicago, Houston Museum of Fine Arts, Amon Carter Museum in Fort Worth, and the Corcoran Museum of Art in Washington, D.C., among others.

Hunter joined SMU in 1976, just after earning an M.F.A. degree in photography from Rhode Island School of Design.

For more information: **Debora Hunter**
dhunter@mail.smu.edu
<http://meadows.smu.edu/default.asp?page=Art-DHunter>

A design created by SMU
photography professor
Debora Hunter has
transformed a barren
patch of land surrounded
by warehouses and
eight lanes of freeway
into a pleasant oasis for
harried urban commuters.

Improving Mobile Computing

When an earthquake, flood, or other natural disaster strikes, officials must be able to establish networks immediately. These networks must enable rescue workers to compute and communicate on the move with ease.

Research conducted by **Hesham El-Rewini**, chair of the Department of Computer Science and Engineering, aims to find a way to rapidly establish mobile networks that are both flexible and functional.

Currently, two methods of mobile computing exist: one uses the Internet for its infrastructure, which is fast, but not always flexible. The other uses wireless networks, which offer flexibility but not necessarily reliable performance. El-Rewini, who is trying to integrate the best features of both, has received a three-year grant from the Army Research Office to support his work.

In addition to offering potential benefits for disasters and battlefield communication, the research has many other potential applications, such as improving health care in rural areas that do not have good network infrastructure. El-Rewini conceived the idea for his research while living in Nebraska, where much of the state is sparsely populated and it is economically unfeasible to install communications infrastructure.

The research could help telecommunications companies provide service to larger populations more efficiently, El-Rewini says.

El-Rewini's other area of interest is parallel processing, in which computers complete multiple tasks simultaneously or process large amounts of information quickly. Parallel processing has many applications, including weather forecasting, simulating proposed systems, and sorting large amounts of genetic information — a field known as bioinformatics.

El-Rewini writes software that can schedule tasks and coordinate different computers for parallel processing. He already has written three books on parallel computing that are used worldwide. His fourth book, *Computer Organization and Architecture*, will be published later this year.

El-Rewini joined the SMU faculty in 2001 after serving as a professor and interim chair of the Department of Computer Science at the University of Nebraska at Omaha. He received his Ph.D. in computer science from Oregon State University.

For more information: **Hesham El-Rewini**
rewini@engr.smu.edu
<http://engr.smu.edu/~rewini/>

Following the Money Trail

Of all the great political debates in American history, the most enduring has been the size and scope of government. The debate has been waging since Thomas Jefferson and Alexander Hamilton organized the nation's first political parties in their struggle over the powers of the federal government to tax, spend, and borrow.

From that first philosophical division over money, many others have followed, according to **Dennis Ippolito**, the McElvaney Professor of Political Science and author of *Why Budgets Matter: Budget Policy and American Politics*, which looks at the connection between budgets and national politics. How Americans pay for their government has never stirred political passions as intensely as other issues, such as slavery, wars, and civil rights, Ippolito says, but fol-

lowing the money trail provides a means to understand the evolution of American government.

"Most of what government does depends heavily on money. So if you were to take one element of policy and try to interpret broadly what government is all about, that is the area you would pick," says Ippolito, who also chairs the Department of Political Science in Dedman College.

In *Why Budgets Matter*, Ippolito focuses on several distinct stages in the political development of the United States, from the small government era before the Civil War to the dramatic transformations of the New Deal and Cold War to the modern welfare state. Budget debates have marked each era.

To research his book, Ippolito reviewed 19th-century historical statistics and treasury reports, precursor to the executive budgets introduced in the 1920s. He also studied congressional committee reports and floor debates. What most Americans consider to be the annual federal budget is in reality the President's budget, Ippolito says. The federal budget is the result of 13 appropriation bills that go through Congress each year. In effect, there is no single budget on which Congress votes.

In tracing the growth of spending, Ippolito says the composition of government matters as much as size. Budget debates usually occur over how much to spend for competing public purposes, what to tax and how heavily, and whether to borrow and accumulate debt. Some of the more famous budget debates include the pre-Civil War tariffs debates between the North and the South, the Progressive Era fight over the federal income tax, and the "priority debates" during the 1960s and '70s between military defense and domestic programs. What single factor grew American govern-

ment the most? Wars and the debt accumulated fighting them, Ippolito says.

In the past 100 years, government at all levels has grown and the federal government's size has grown in proportion to the states, Ippolito says. At the turn of the 20th century, government at all levels accounted for 10 percent of the Gross National Product (GNP), a third of which was federal. Today it is a little under 35 percent of the GNP, 20 percent of which is federal.

Ippolito has delivered an annual lecture on federal budget policy and defense spending at the U.S. Army College since 1991. Each year, he says, the level of budget literacy grows among the nation's top military men and women, who often find themselves in the crosshairs of the spending debates over defense and domestic programs.

Why Budgets Matter is Ippolito's eighth book. His other books have focused on national defense, federal and congressional spending, public opinion, and American politics. He has received grants from the National Science Foundation and the Ford and Rockefeller Foundations to support his research.

Ippolito received his Bachelor's degree in history and government from Adelphi University and his Master's degree and Ph.D. in government from the University of Virginia.

For more information: **Dennis Ippolito**
ippolito@mail.smu.edu

Following the money
trail provides a means
to understand the
evolution of the
American government.



faculty profiles



Reimagining Indians

From Western savage to counterculture icon, generations of white Americans have painted Indians to their likeness. Examining these perceptions of Native Americans and their evolution in American history is the research focus of **Sherry Smith**, professor of history in the William P. Clements Jr. Department of History.

Smith is the author of two books on the way Indians are perceived outside their culture. Her works include *The View from Officers' Row: Army Perceptions of Western Indians* and *Reimagining Indians, 1880-1940*.

Perceptions about "Indianness" have shifted gradually

over time. During the frontier era, Smith says, most Anglo-Americans wanted to conquer and assimilate Indians into a dominant white society. By the turn of the century, however, those attitudes began to change after several Eastern writers published firsthand accounts of living among the Western tribes. Smith explores these champions of Native American culture in her most recent book, *Reimagining Indians*. They include Mabel Dodge Luhan and Charles Fletcher Lummis, who spent time with Indians in the Southwest, and Walter McClintock and George Bird Grinnell, who turned their attention to the Indians of the Pacific Northwest and Northern Rockies. The authors related their experiences through lecture tours, essays, poems, books, and national magazine articles.

"Because their books were widely read and influential, they helped us understand what I would call modern Anglo-American ideas about Indians," Smith says.

These ideas paved the way for new a federal Indian policy in the 1930s that scrapped assimilation programs and promoted cultural preservation. A second revival of Anglo interest in Indians occurred during the 1960s, when Indian activism exploded on the nation's consciousness with the occupation of Alcatraz Island by Native Americans who were protesting federal Indian policies and with the siege at Wounded Knee in South Dakota. Young whites began experimenting with "Indianness," but Smith says they appropriated more in appearance than in substance. They adopted hairstyles and clothing

and were attracted to the tribal communal living arrangements. In their eyes, Indians were romantic figures living free of conventional American mores. Other members of the New Left took the Native American rights movement more seriously and became involved in their political struggles. Smith is researching this period of American history for her forthcoming book.

Smith also has edited a new volume of essays on the future of the Southern Plains. The anthology is the result of a symposium on the Southern Plains presented in April 2002 by the Clements Center for Southwest Studies in Dedman College. It featured historians, climatologists, oil economists, and geographers who discussed the region's past and trends affecting its growth. The University of Oklahoma Press will publish the book in fall 2003.

Ensuring Homeland Security

Perceptions about
"Indianness" have
shifted gradually
over time.

At left is Kutenai Duck
Hunter, a photogravure
on vellum made in 1910
by Edward S. Curtis.
Reproduced courtesy
Amon Carter Museum,
Fort Worth, Texas.

Homeland defense comprises more than protecting U.S. borders, cities, and airports. SMU Law Professor **John Lowe** says energy security matters, too.

"Terrifying though the specter of terrorist attacks may be, the risk of domestic economic disruption resulting from political turmoil in one of our main supplier countries is more significant," says Lowe, the George W. Hutchison Professor of Energy Law at SMU's Dedman School of Law. He has researched American energy policy for more than 25 years.

Because the United States is the world's largest consumer of energy, its dependence on foreign oil affects the global economy, Lowe says. When the price of imported oil rises in America, it rises everywhere, and more than half of U.S. oil imports come from the Organization of Petroleum Exporting Countries (OPEC). Turmoil in the Middle East, such as a war or political revolt, can spike oil prices, triggering a worldwide recession or spiraling inflation, as happened twice in the 1970s.

Even without the war on terrorism, Lowe says threats to the world's oil supply already exist. Iran, Iraq, and Libya support or provide haven to terrorist groups. In other Arab societies, wealth inequality from oil causes civil unrest and feeds resentment toward America.

"Our reliance on oil imports requires that the United States shape its foreign policy to protect the supply of imported oil by propping up the regimes of our primary suppliers, further inflaming internal dissent," Lowe says.

America's Achilles' heel is its car culture, Lowe says, noting that transportation constitutes 95 percent of U.S. energy consumption. He advocates an energy policy geared toward national security and proposes increased fuel efficiency, higher energy taxes, and a cushion against import disruptions, such as drilling for more domestic

sources of oil in the Arctic National Wildlife Refuge (ANWR). All are controversial measures, he concedes, because of the sacrifices required.

"Our culture is about making more, not living on less," he says.

Lowe is vice president of the Rocky Mountain Mineral Law Foundation and a former chair of the Environmental, Energy and Resources Law Section of the American Bar Association. He is an honorary lecturer and principal researcher at the Centre for Energy, Petroleum and Mineral Law at the University of Dundee in Scotland. Lowe received his J.D. degree from Harvard University.

For more information: **John Lowe**
jlowe@mail.smu.edu

Going for the Goal

Don VandeWalle first became interested in motivation research while coaching college track as a twenty-something. He observed how athletes approached tasks psychologically, qualities he came to know as "goal orientations."

The concept of goal orientation was first identified by researchers working with children in the early 1980s. As an associate professor of management and organizations in Cox School of Business, VandeWalle has become a leading management scholar on investigating "goal orientations" of adults in work and education settings.

VandeWalle says that athletes he coached who had "learning goal orientations" focused on improvement and mastery. They worked hard in practice, appreciated feedback, and were resilient to setbacks. "They always thought that with enough hard work, they were going to develop and excel."

Those who exhibited "performance goal orientations" were more focused on the appearance of looking successful and avoiding the risk of failure. Their concern about looking successful, however, was not matched by the hard work needed to actually be successful. "If

you gave them feedback about how they could improve, they felt criticized," VandeWalle says. "They weren't interpreting the information as important data about how they could improve, they were interpreting it as an evaluation or judgment about them."

"I saw these goal orientations in a very real sense from my coaching days," VandeWalle says. "As I started working with college students and conducting research with employees, I saw the same orientations playing out in academic and corporate settings."

A 1999 article in the *Journal of Applied Psychology* with co-authors Steve Brown, Bill Cron, and John Slocum, O. Paul Corley Distinguished Professor of Management and Organizations in Cox School of Business, illustrates the connection between goal orientation and success. In a study conducted with salespeople at a major medical supply distributor, they found that a learning goal orientation, but not a performance goal orientation, had strong relationships with sales goals, effort, and strategic planning, leading to higher sales performance. Salespeople with a strong learning goal orientation outsold salespeople with a high performance-low learning goal orientation profile by 300 percent. "We find in our research that a preoccupation with wanting to look successful often can sabotage the likelihood of an individual actually being successful," VandeWalle says.

VandeWalle, who joined the SMU faculty in 1995, has most recently published articles on goal orientation in *Human Resource Management Review*, *Educational and Psychological Measurement*, *Organizational Dynamics*, and the *Journal of Applied Psychology*. He received a B.A. in communications and business economics from Park College, an M.B.A. from the University of Kansas, and a Ph.D. in organizational behavior and strategic management from Carlson School of Management at the University of Minnesota.

For more information: **Don VandeWalle**
dvande@mail.cox.smu.edu
faculty.cox.smu.edu/dvandewalle.html

Smith teaches courses on the history of American Indians, 19th- and 20th-century Western history, and women in the American West. In addition to teaching, she is associate director of the Clements Center for Southwest Studies. She has been a Fulbright scholar in New Zealand and has received awards and fellowships from the American Historical Association, the Beinecke Library at Yale University, and the Andrew Mellon Foundation. She also has received grants from the National Endowment for the Humanities to support her research. Her first book was *Sagebrush Soldier: Private William Earl Smith's Views of the Sioux War of 1876*.

Smith received her Ph.D. in history from the University of Washington.

For more information: **Sherry Smith**
sherrys@mail.smu.edu

faculty profiles



THE BLAIR WITCH PROJECT



The Fear Factor on Film

What do people fear? How do those fears change over time? And how does popular culture change to reflect our shared terrors? Film historian **Rick Worland** examines these issues in *The Horror Film*, to be published later this year by Cambridge University Press.

Worland, associate professor of cinema-television in Meadows School of the Arts, describes *The Horror Film* as a survey of the genre and its formative antecedents in art and literature — largely written for his own classes. He begins with Renaissance paintings of the Last Judgment, emphasizing “the horror of their content and the contrast they draw between Heaven and Hell,” he says. “Heaven seems pretty abstract, but Hell frequently and graphically depicts the destruction of the physical body.” The fear of death and its importance and threat to the human form is a recurring theme in horror of every kind, he adds.

The book also discusses late

18th-century Gothic literature and what Worland calls the three archetypal monsters created in the 19th century: Frankenstein, Dracula, and Dr. Jekyll and Mr. Hyde. He traces horror’s development in different eras and film styles through representative works such as *Frankenstein*, *Dracula*, *Invasion of the Body Snatchers*, *The Texas Chainsaw Massacre*, and other classics.

What scares audiences from generation to generation? Worland says that certain basic ideas continue to terrify through the ages, but larger societal and historical changes contribute to the fear factor. He cites 1920s and ’30s horror films for how they assimilated the experience of World War I. “You get an awful lot of scary faces and grotesque characters,” he says, recalling the devastating impact of mechanized warfare on a world that had experienced it on an unprecedented scale.

Similarly, 1950s horror and science fiction films play to Cold War anxieties. Monsters such as Godzilla are created by atomic testing and battled, usually ineffectively, by the military, reflect-

In every era, what scares

people, socially and

individually, is going to change.

ing fears that the Allies’ conventional martial might that won World War II was essentially powerless against a nuclear threat. In every era, Worland says, “what scares people, socially and individually, is going to change.”

Worland received his Ph.D. and Master’s degree from UCLA in motion picture and television critical studies. He has been a member of the SMU faculty since 1991.

For more information: **Rick Worland**
rworland@mail.smu.edu

Rethinking Work

Balancing work at home and on the job has been a research project with a personal interest for **Rebekah Miles**, associate professor of ethics in Perkins School of Theology.

As she and her husband have reordered their busy professional lives to provide optimal care for their two preschool daughters, Miles has sought answers to the ongoing challenge through her research. “What are the natural patterns of human work?” she asked at SMU’s Maguire Public Scholar Lecture in November 2001. “What are the moral obligations for work in human life? And under what conditions do we shake our heads and say, ‘That’s all a human can do.’”

Miles has analyzed studies that show a significant rise in hours worked by Americans during the past 30 years, leading to less sleep, sex, personal time, socializing, church attendance, and community service, while increasing their stress- and weight-related medical problems, frustration with bosses and co-workers, consumption of alcohol and cigarettes, and the number of mistakes on the job.

Many experts attribute the imbalance to self-centeredness, Miles says. They argue that

middle-class Americans today focus more on the pursuit of personal fulfillment while previous generations focused on the fulfillment of obligations to family and the larger community. However, Miles’ research has led her to a different theory.

“I wonder if their problem is not self-centeredness but the loss of their center altogether,” she says. “People can lose both themselves and their proper central focus on God by overfocusing or inappropriately focusing on a child or mate, a job, alcohol, obsessive spending and so forth.”

Addressing imbalance in the context of “de-centeredness” instead of self-centeredness may alter the responses of religious, educational, business, and political leaders, Miles says. She suggests rethinking work as vocation. “Mission and service are not only the volunteer, extra things we do, but they can encompass our everyday jobs.”

She also suggests greater cultural acknowledgment of the importance of parenthood, citizenship, and faithfulness to God as vocations, or ways “that humans participate in God’s work in the world.”

Miles says she has had more enthusiastic responses from audiences about this project than any previous work. She is working on a book about the topic, titled *What, Then, Shall We Do? Rethinking Work and Vocation*.

“I think people are interested in it because of what’s going on in their own lives,” Miles says. “There’s a shifting going on in American life. I’m trying to figure what’s shifting, what’s driving the shift, and how we can respond.”

Miles joined the SMU faculty in 1999. She received a B.A. from Hendrix College, an M.Div. from Iliff School of Theology, and a Ph.D. from The University of Chicago Divinity School.

For more information: **Rebekah Miles**
rlmiles@mail.smu.edu
www.smu.edu/theology/people/miles.html

faculty recognition

G. William Barnard, Religious Studies, **Christopher H. Hanna**, Law, **John Maguire**, Chemistry, and **Beth Newman**, English, were named University Distinguished Teaching Professors in spring 2002 and are now members of SMU's Academy of Distinguished Teachers.

Lewis R. Binford, Anthropology, **Richard Bozorth**, English, and **Joery Rieger**, Theology, received the 2002 Dedman College Godbey Lecture Series Authors' Awards for outstanding scholarly research. Binford received the award for his book, *Constructing Frames of Reference: An Analytical Method for Archaeological Theory Building Using Ethnographic and Environmental Data Sets*; Bozorth was honored for *Auden's Games of Knowledge: Poetry and the Meanings of Homosexuality*; and Rieger was recognized for *God and the Excluded: Visions and Blindspots in Contemporary Theology*.

Carole Brandt, Meadows, received the Encomienda de la Orden de Isabel La Catolica, the highest distinction granted to non-Spaniards who promote good relations between Spain and America.

Edward Countryman, History, was elected to the Society of American Historians. Election signifies a combination of research and literary distinction, and membership is limited to 200 members.

Craig Flournoy, Journalism, received second place in the Mass Communication and Society Division for the best graduate student paper presented at the 2001 national convention of the Association of Education in Journalism and Mass Communication. The paper was titled "Media

Ownership and Bias: Study of News Magazine Coverage of the 2000 Presidential Election Campaign."

Tom Fomby, Economics, received the United Methodist Church's 2002 University Scholar/Teacher of the Year Award.

David Freidel, Anthropology, was appointed a University Distinguished Professor.

Serge Frolov, Religious Studies, was named to the Nate and Ann Levine Endowed Chair in Jewish Studies.

Ezra Greenspan, English, was named the first holder of the Edmund J. Kahn and Louise W. Kahn Chair in Humanities.

John S. Lowe, Law, was elected vice president of the Rocky Mountain Mineral Law Foundation.

Richard Mason, Information Technology and Operations Management, received the 2001 Leo Award for Lifetime Exceptional Achievement in Information Systems from the Association of Information Systems at the International Conference on Information Systems.

Patricia Mathes, Education and Lifelong Learning, was named to the TI Reading Chair.

Tom Mayo, Law, received the 2002 Heath Award from the Dallas County Medical Society. He is the first lawyer to receive the award.

Joseph McKnight, Law, received an Outstanding Fifty-Year Lawyer Award at the 2002 annual meeting of the Fellows of the Texas Bar Foundation.

David Meltzer, Anthropology, was appointed to the Henderson-Morrison Chair.

Jack Myers, English, won The Violet Crown Award from the

Writers' League of Texas for the "Best Literary Book" published in Texas or by a former Texan in 2001 for *The Glowing River: New and Selected Poems*.

Geoffrey Orsak, Electrical Engineering, was named a 2002 Distinguished Lecturer for the Signal Processing Society, a division of the Institute for Electrical and Electronics Engineers (IEEE).

Simon Sargon, Music, was awarded honorary membership in The American Conference of Cantors in recognition of his creative contributions to American Jewish music. The Dallas Jewish Historical Society also has named Sargon a recipient of the first Sikora Humanitarian Award in honor of his contributions to Jewish life in Dallas.

Lawrence Shampine, Mathematics, has been honored by Maple, a software for doing mathematical computations, by identifying him as a Differential Equations Expert on a poster that includes historic figures and contemporary experts in mathematics who have contributed to Maple.

Frank Tomasulo, Cinema-TV, was elected executive vice president of the University Film and Video Association (UFVA).

Gordon Walker, Cox, and Tammy Madsen (formerly of Cox and now at the Leavey School of Business, Santa Clara University) received the 2002 Glueck Best Paper

Award from the Business Policy and Strategy Division of the Academy of Management for their paper "The Evolution of Heterogeneity in Performance."

Shlomo Weber, Economics, received a Humboldt Research Prize. The prizes are granted annually to internationally recognized scholars to conduct research in Germany. Awardees are invited to spend between four and 12 months at a German research institution.

Bonnie Wheeler, English, was elected a member of The New Chaucer Society's Trustees and Finance Committee (2002-2006); elected to the Society for Medieval Feminist Scholarship's Advisory Committee (2002-2004); and elected secretary and member of the board for the Consortium on Teaching the Middle Ages (TEAMS).



FROM ART TO PART

SMU Center is Pioneering the Future of Manufacturing

E By Ellen D. Mayou

very antique car buff knows the difficulty of obtaining replacement parts. But imagine if antique car owners could go to their local auto parts store, ask for any part they needed for their 1955 Chevy or 1964 Mustang, and have it built in front of their eyes in fewer than 30 minutes on a machine that looks like a three-dimensional printer.

Radovan Kovacevic, the Herman Brown Professor of Materials and Manufacturing Processes in the SMU School of Engineering, is working toward such a goal.

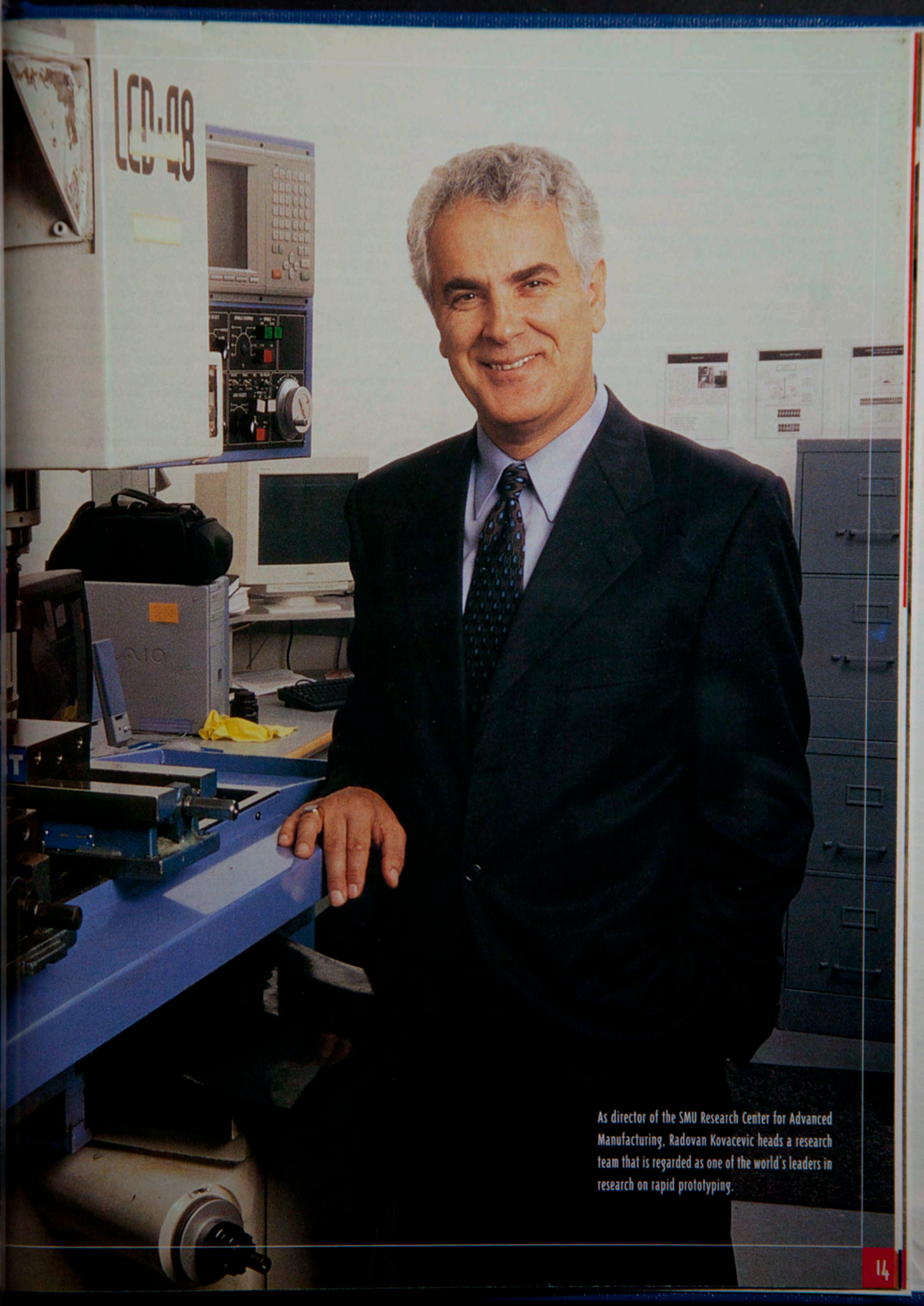
Kovacevic directs the SMU Research Center for Advanced Manufacturing (RCAM). Since its establishment in 1999, the

center has become regarded as one of the world's leaders in research on rapid prototyping. In rapid prototyping, also known as solid free-form fabrication, parts are designed on a computer and the digital data is fed into a machine that builds them one layer at a time.

Rapid prototyping can significantly decrease the time between initial concept and fabrication, thus reducing costs for manufacturers and bringing products to consumers faster.

The center also supports a variety of research and development activities in laser materials processing, waterjet and abrasive waterjet materials processing, welding, sensing, control, and numerical simulation of manufacturing processes and systems.

The center has received more than \$2.1 million in grant



As director of the SMU Research Center for Advanced Manufacturing, Radovan Kovacevic heads a research team that is regarded as one of the world's leaders in research on rapid prototyping.

money from government and state agencies, as well as industry partners. Nearly 200 engineers visit the center each year to attend workshops and seminars on the latest manufacturing techniques. The center also attracts graduate students from around the world.

"RCAM's accomplishments are an outstanding example of research excellence and productivity at SMU," says U. Narayan Bhat, dean of research and graduate studies.

Kovacevic has more than 30 years of research and teaching experience in manufacturing processes and materials science. A native of Yugoslavia, he received his Bachelor's and Master's degrees in mechanical engineering from the University of Belgrade and his Ph.D. in mechanical engineering from the University of Montenegro. He served on the faculty at the University of Montenegro for 16 years, and later held faculty positions at the University of Wisconsin-Madison, Syracuse University, and the University of Kentucky. Kovacevic holds three U.S. patents and 14 invention disclosures and has authored and co-authored more than 330 technical papers and five books. SMU recruited him in 1997 with the lure of starting a new program in a larger city with more industry.

Today, Kovacevic leads the largest research team at SMU, which consists of two faculty members, 10 Ph.D. candidates, a postdoctoral researcher, a Master's degree student, and a research engineer. Most of his Ph.D. students have earned one doctorate before they even join the research team.

The center is housed in a 7,000-square-foot facility in Richardson, Texas, that is widely praised for being one of the best university-based facilities in the country for conducting research in cutting-edge technologies. It comprises six laboratories, each focusing on a specific problem or opportunity related to manufacturing. One laboratory, for example, has developed a computer-controlled feeder that can mix up to four different metallic powders and make complex alloys by synthesizing them with a high-powered laser beam.

"These powder feeders allow us to deposit the right quantity of material to the right place at the right time for layer-based manufacturing," Kovacevic says. The SMU team is only the second in the country to develop such a system for making what is known as functional gradient material by laser-based additive manufacturing. Such material is able to withstand extremely harsh environments and has applications for numerous industries, including aerospace, mining, nuclear power, automotive, and biomedical.

Another laboratory has developed a technique based on variable polarity plasma arc welding for materials such as aluminum that are traditionally difficult to weld. The laboratory also is developing a real-time sensing and control technique for monitoring the quality of welds during welding, which would improve quality control for such industries as aircraft and aerospace.

Another laboratory focuses on sensing and controlling different manufacturing processes, with the goal of eliminating human involvement. "We want to develop a fully automated system that will provide a seamless flow of information from design to production," Kovacevic says. This laboratory also is developing an on-line tool condition monitoring system that could be used during welding of aluminum alloys by friction stir welding.

Currently, the laboratories are working together to develop a system that will combine several processes and devices to manufacture parts from computer files, either onsite or in remote locations. The system will be able to perform two additive operations such as depositing metal by means of welding or a laser-based additive process, conduct subtractive operations such as milling and drilling, perform "reverse engineering" to recreate parts, and conduct post-processing inspection of the parts that are created.

Kovacevic has called his proposed system the Multi-

Fabrication System for Rapid Manufacturing and Repair, or MultiFab™ system. It would incorporate six invention disclosures that Kovacevic and his team have submitted for patents.

"Machines being built today are still single function," Kovacevic says. "Rather than use single-purpose machines, manufacturers could use a MultiFab™ machine and make almost any part economically. This would result in greater machine utilization and, in turn, would be more profitable to the manufacturer."

A MultiFab™ machine would be particularly valuable to the aviation, aerospace, and defense industries, Kovacevic says. The defense industry, for example, has shown a strong interest in having a "mobile part hospital" that could produce or repair a variety of parts in different environments, such as on the battlefield or in submarines.

"A system such as this could help strengthen the country's military readiness," Kovacevic says.

A company in Waco, Texas, has expressed an interest in marketing the MultiFab™ machine.

The Research Center for Advanced Manufacturing also provides expertise to local industries. Halliburton Energy Services asked Kovacevic and his team to help it find the best combination of materials to make its downhole tools more erosion-resistant. The center is researching the best combination of metal powders that can be applied in a thin layer over the tools, and then testing the coatings under an abrasive waterjet to simulate the harsh environments encountered during the stimulation of oil and gas wells.

"SMU's capability in this area of manufacturing will allow us to expand the capabilities of our tools, making energy production more efficient and economical," says Syed Hamid, who manages the Research Department at Halliburton Energy Services.

Research projects at the center have provided opportunities for more than 50 students – including 15 postdoctoral, 19 Ph.D., and five graduate – to participate.

Most doctoral and postdoctoral students who come to work at the center go into industry after gaining additional experience in such areas as materials science, controls, sensing, and modeling, Kovacevic says.

Four SMU undergraduate students have participated in research at the center through the National Science Foundation's Research Experience for Undergraduates program. Six Texas high school teachers also have participated in research through the NSF's Research Experience for Teachers in Science and Math program and a program sponsored by the Texas Higher Education Coordinating Board.

"The center is a wonderful example of bringing relevance to the academic environment through groundbreaking engineering research," says Joseph J. Beaman Jr., chair of the Mechanical Engineering Department at The University of Texas at Austin. Beaman is one of several academic partners who have collaborated with the center on research projects and proposals. Others include Columbia University and the University of Nebraska.

Advancements pioneered at the center are incorporated into engineering courses taught at SMU, such as a graduate course in nontraditional manufacturing processes and an undergraduate course in manufacturing processes.

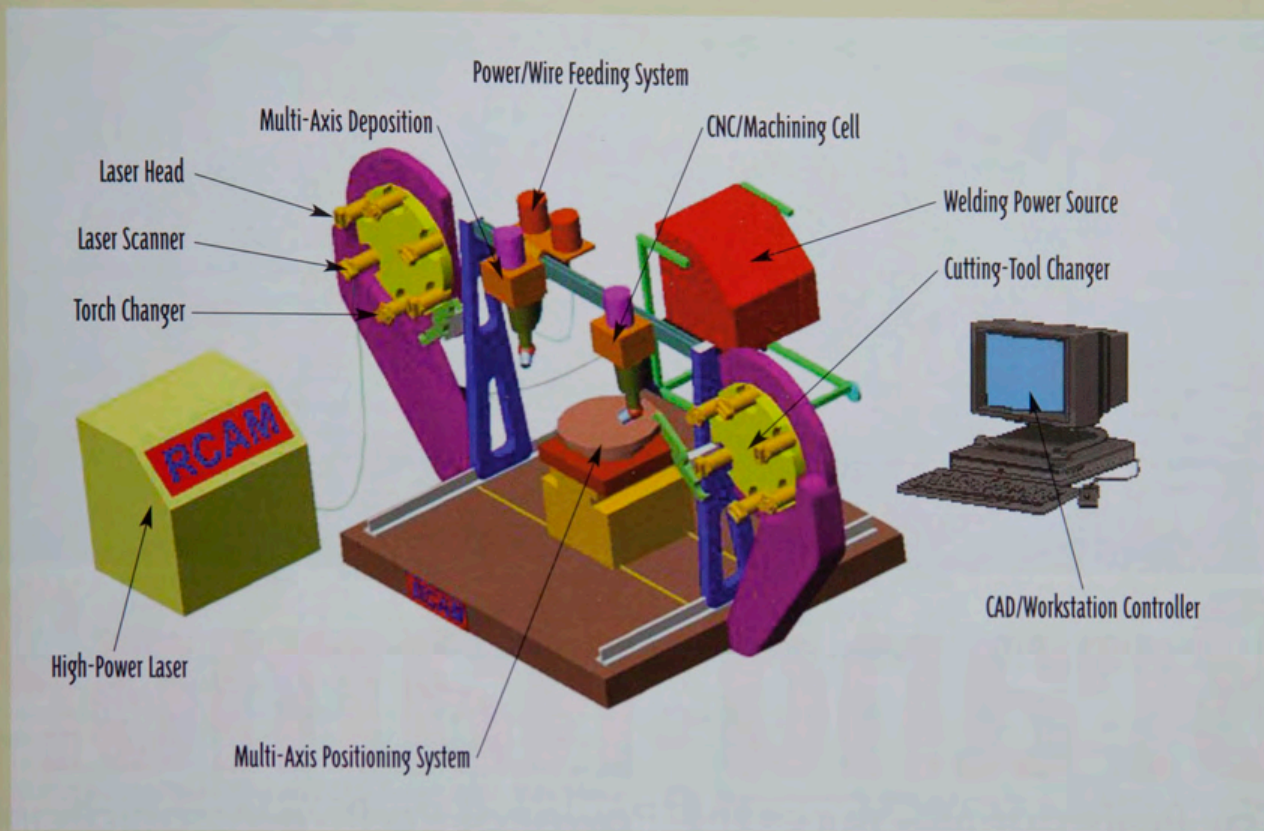
In 2004 the center and the SMU School of Engineering will host a conference for about 500 NSF grant recipients in the areas of design, manufacturing, and industrial engineering.

"The center is bringing well-deserved recognition to SMU and the School of Engineering," says Dean Stephen Szygenda. "It is a unique operation that combines academia, industry, and government toward a common goal of relevant and excellent research." ■

For more information: www.engr.smu.edu/rcam/

ANATOMY OF A MOBILE PART HOSPITAL

This diagram shows how a MultiFab™ system being developed at SMU's Research Center for Advanced Manufacturing could custom-make almost any part economically. Such a system could serve as a "mobile part hospital" for the military that could produce or repair a variety of parts in different environments. The system incorporates six invention disclosures that have been submitted for patents.



Center Offers Corporate Memberships

Corporations can benefit from research conducted at the Research Center for Advanced Manufacturing by becoming corporate members of the center.

Membership entitles corporations to full access to the center's unique facilities and expertise and provides an opportunity to recruit highly qualified graduate students.

Annual membership fees are based on company size, and can be applied toward research projects that will benefit individual or groups of companies.

"With many companies cutting research and development

funding, it is more important than ever for universities to work closely with industry to address key research and development issues in manufacturing technology," says Radovan Kovacevic, director of the center.

The center can leverage industry support to gain additional funding from state and government agencies, Kovacevic says.

Local companies that have signed on include Halliburton Energy Services. For more information on corporate membership, call 214-768-4865.



What's in a Brand Name?

Cox Professor Measures the Power of Positive Association

By Kathleen Tibbets

Imagine buying Coca-Cola from a vending machine and getting an unmarked can of pop with no familiar logo, no red-and-white markings, nothing to identify it as a soft drink, let alone as the Real Thing. Would that product still be Coke as we know it? And would consumers purchase this product without its world-famous packaging?

The truth is, the only physical product that the Coca-Cola Company sells is soft drink syrup to bottlers – not the bottles and cans of Coke that consumers buy. The company's greatest success comes from selling its brand, says William Dillon, associate dean for academic affairs and Herman W. Lay Professor of Marketing and Statistics in SMU's Cox School of Business. Dillon's research helps to differentiate among the threads of association and bias that affect consumer product choices and enables companies to make sense of where and why their products achieve their market positions.

To find these results, Dillon says, it's important to distinguish among the factors involved in consumer decisions and how they affect aspects of a brand's identity. He first makes the distinction between *brand equity* and *brand valuation*. Brand equity, like equity in a home, "is meant to reflect appreciation – the good things and

positive associations that accrue because the brand has delivered on its stated promises," Dillon says. "Equity is the brand's asset." Brand valuation, as determined through such exercises as Interbrand's annual top 100 brands list published in *Business Week*, attempts to attach a measurable value to that asset.

"Typically, one looks at the market share of the brand and the price premium that the brand commands," Dillon says. "The notion is that brands that have created equity command a price premium in the marketplace." Hence consumers may pay \$1.89 for a cup of Starbucks coffee when they could purchase the same volume for about 69 cents at another coffee shop. Most equity research tries to assess the strength of a brand through price premium or market share, he says.

One simple way of assessing this is to "equalize the products, label them, and then see how much someone is willing to pay," Dillon says. For example, a coffee company may put the same brew in two containers – one labeled "Starbucks" and the other, perhaps, "Bill's Fresh Coffee." If consumers prefer the Starbucks coffee and will pay more for it simply because of the label, their choices appear to be determined by their positive associations with the Starbucks' name.

Such methods encounter obstacles, however, when it comes to finding an unbranded alternative to use as a base case. Typically, the benchmark is a product with no brand effect, such as a store brand or an unmarked generic. "But there really aren't unbranded products any more," Dillon says. Many in-house and regional brands have established strong presences in the modern marketplace.

To manage such dilemmas, Dillon's work separates the *brand effect* from the *product effect*. The brand effect demonstrates that a consumer will pay extra for a cup of Starbucks coffee simply because it's Starbucks, and not because the product is intrinsically better. On the other hand, if consumers believe that Starbucks uses a higher-quality bean, or that its brewing methods produce a better-tasting coffee, their choices are based on the product effect – a perception that Starbucks coffee is fundamentally better than that of its competitors.

A consumer may rate a product on a favorable characteristic – strength for a pain reliever, or decay prevention for a toothpaste – on a scale of 1 to 10. Dillon's models separate the customer's rating into two components: the Brand-Specific Association (BSA), or the actual linkage between the attribute and the brand; and the General Brand Impression (GBI), or the consumer's general like or dislike of the brand itself. This breakdown allows companies to understand the weight that general impressions can carry in driving consumer choice.

Dillon's summary of this work, co-written with Cox Associate Professor of Marketing Amna Kirmani, won the 2002 Paul E. Green Award, given each year to the paper published in the *Journal of Marketing Research* during the previous year that shows or demonstrated the most potential to contribute significantly to the practice of marketing research and research in marketing.

A benefit of Dillon's model is that it accommodates brand ratings as they typically are gathered in customer tracking surveys – for example, the 1-to-10 unfavorable-or-favorable scale. In addition, the model "provides information about the extent to which a brand has achieved superiority or 'ownership' of specific brand attributes," the authors write. A larger BSA rating indicates stronger consumer identification with a positive characteristic, while a larger GBI component indicates that a brand's overall image is playing the primary role in the customer's rating.

The ways in which consumers retrieve or compute personal brand ratings play an important role in the assessment. "When I say 'Starbucks,' that conjures up certain associations that may not only be about the product," Dillon says. "It's also about the environment in which you consume the product, the merchandise, the setting, the social ambience. That these associations build in people's minds, and that people rely on them in making choices, is another measure of the strength of the brand."

Research demonstrates that general brand impressions heavily



"Strong brands build emotional attachments. They attempt to develop a relationship," says William Dillon of Cox School of Business.

favor the dominant brand in a category, Dillon says. "When people rate the market leader on a number of attributes, it's not surprising that it comes out the leader on all those attributes – even when we know they're not superior on all of them." Dillon calls this "halo error" and says it often distorts the reflection of how well a company has developed an association between its brand and an attribute.

Yet because much of building a brand occurs in its marketing activities, recognizing the social context of a product's use can be even more important than owning an attribute, Dillon says. "Strong brands build emotional attachments. They attempt to develop a relationship." He cites Jell-O as a prime example. "Jell-O historically is a product that allows mothers and children to bond," he says. "It's not the consumption of the Jell-O they remember, but the preparation, the colors, the fun they had in making it" – and Jell-O's marketing activities reflect this.

"A product's physical attributes do not represent a sustainable marketplace advantage," he adds. "Over time, competitors will imitate, patents will run out, buyers no longer can tell the difference among similar products.

When the product effect dissipates, what's left is people's attachment to the brand. Strong brands recognize this."

Dillon's research also has clear implications for companies that wish to add products to a line or branch into different categories and who must assess whether their brands are capable of carrying a core success into these new endeavors. "As companies move further away from their key products, the brand may play a more prominent role in people's reactions to the new products," Dillon says.

He cites Nike as an example of a company using a strong image to expand its market. When the company began, it carved a strong but narrow niche as a maker of high-performance athletic shoes. Nike's fortunes changed permanently when "they realized that everybody wants to be an athlete for 15 minutes a day," Dillon says. The company's expanded product line, coupled with its "Just Do It" image campaign, transformed Nike from a specialty manufacturer into a global phenomenon. "It wasn't the physical attributes of the product that allowed them to extend the brand – it was the imagery they'd built around what it is to wear Nike."

In his classes on "Analytic Methods for Understanding What Consumers Value," Dillon teaches students to ask the right questions about consumer preference. "When our M.B.A. students graduate, they have to wrestle with fundamental questions. Who are your customers? Who should be your customers? What do they value in the categories they consume? People have certain preferences for certain kinds of products, and it's fundamentally important to know why." ■

For more information: William Dillon
dillon@mail.smu.edu



The Department of Biological Sciences has gained an international reputation for its research on the relationship between antioxidants and the aging process. William Orr leads this research, which uses the fruit fly *Drosophila* as a model.

BIOLOGICAL BUILDING BLOCKS

New Facility and Scholars
Enhance SMU's Research
Programs in the
Biological
Sciences



B y E l l e n D . M a y o u

Trypanosoma brucei may not be a household word in the United States, but it is widely known in Africa, where the microscopic parasite spread by the tsetse fly threatens public health by infecting the nervous system and causing the disease commonly known as sleeping sickness. An estimated 300,000 people in sub-Saharan Africa die each year from trypanosomiasis, which is always fatal when left untreated.

"Trypanosomiasis is part of a group of great neglected diseases," says Larry Ruben, chair of the Department of Biological Sciences in Dedman College. "Most of these diseases predominantly affect people outside the United States."

Ruben has spent the past 20 years studying different ideas

that may someday lead to an effective method for eliminating *Trypanosoma brucei*.

The task is difficult because the trypanosome is a eukaryotic cell, just as are human cells. Therefore, drugs that are likely to affect the trypanosome are just as likely to affect the host, Ruben says. "Most of the existing drugs to fight trypanosome are extremely toxic."

Ruben is trying to find unique processes in the trypanosome that can be used to design new therapies. His current research focuses on the pathways that regulate cell division and cell death. "Our goal is to find a way to get the cell to kill itself or to stop it from dividing properly," he says.

Ruben is one of the researchers in Biological Sciences using the latest technology to study diseases as well as the fundamental mechanisms of cells.



ABOVE: New faculty members Robert Harrod and Pia Vogel are adding to SMU's growing expertise in the biological sciences. RIGHT: The new Dedman Life Sciences Building has enabled the Department of Biological Sciences to recruit promising young scholars such as Harrod and Vogel.



Last year the department moved into its new quarters in the 68,000-square-foot Dedman Life Sciences Building. In addition to providing more space for classrooms and laboratories, the building has enabled the department to recruit several promising young scholars.

Among them is Robert Harrod, a virologist who joined the SMU faculty last fall from the National Cancer Institute, National Institutes of Health. Harrod is studying two retroviruses – the HIV-1 virus that causes AIDS and the Human T-cell Lymphotropic Virus (HTLV), which causes Adult T-cell Leukemia/Lymphoma (ATLL). By providing a more detailed understanding of the underlying molecular mechanisms associated with the pathogenesis of these retroviruses, Harrod's work may identify novel targets for anti-retroviral drug therapies.

"Robert is, without a doubt, one of the most prolific young scientists I have ever seen," Ruben says, noting that his work has been published in such prestigious journals as the *Proceedings of the National Academy of Sciences*.

Harrod's work will complement research conducted by Rick Jones, a developmental biologist who also is studying how the addition and removal of different protein components can change the regulation of genes. Jones is gaining international recognition for his studies of a protein known as E(Z), which he discovered while doing postdoctoral research at Harvard. His work applies to the process of human development and cancer. Jones is collabo-

rating with researchers at the University of North Carolina's Lineberger Comprehensive Cancer Center to learn more about how this important protein works to repress gene expression. The journal *Science* published a paper of theirs last year.

Also joining SMU last fall was Pia Vogel, a biochemist with expertise in electron spin resonance (ESR) procedures who studies dynamic properties of protein structure. Much of her work examines how cells manufacture adenosine triphosphate (ATP), a chemical produced in a cell's mitochondria that provides energy. Virtually every cell function, from the building of bones to the contraction of muscles and the transmission of nerve impulses, relies on ATP.

"Pia is the only person in the Dallas area to use the electron spin resonance method," Ruben says. "She brings unique expertise to the SMU campus."

Vogel's work complements research by Steven Vik, professor of biological sciences, who is researching a different protein in the ATP synthase. Vik received a four-year, \$637,000 grant from the National Institutes of Health to support his work, as well as a grant from the Welch Foundation.

A \$1 million grant from NASA's Office of Biological and Physical Research gave the Department of Biological Sciences a boost last summer. The grant supports research by providing



ABOVE: A \$1 million grant from NASA's Office of Biological and Physical Research enabled the Department of Biological Sciences to purchase this confocal microscope that Department Chair Larry Ruben uses for his studies of the microscopic parasite *Trypanosoma brucei*.

start-up funds for the new faculty members and enabling the department to purchase some specialized equipment. New equipment purchased with the grant includes a confocal microscope that will enable researchers to identify individual proteins from among the 10,000 proteins in a cell. Harrod, for example, will use this microscope to study the dynamics of certain proteins in cells infected with HIV.

Other new equipment extending the department's capabilities includes a fluorescence-activated cell sorter for the analysis of tagged cells within a population, an electron spin resonance spectrometer that will help faculty members learn more about the structure of large proteins, and a microcomputer that the department will use to help analyze protein folding and protein-protein interactions.

"This grant is another step in the process of helping us build one of the truly excellent biological sciences programs," says Jasper Neel, dean of Dedman College.

Already, the department has gained an international reputation for its research on the relationship between antioxidants and the aging process. This research, which uses the fruit fly *Drosophila* as a model, is led by William Orr, professor of biological sciences. Orr recently received a five-year, \$1,125,000 grant from the National Institutes of Health, bringing his annual

research funding to nearly \$500,000.

The new grant will enable Orr to study a family of genes known as thioredoxin peroxidases that was just discovered in the past decade. The genes appear to have antioxidative properties, and Orr is one of the first researchers to investigate how they may protect against aging.

Pia Vogel's expertise in electron spin resonance procedures is expected to further SMU's studies on aging, because spin-labeled probes can be used to tag specific proteins and monitor the accumulation of oxidative damage in a variety of conditions.

The department plans to add up to three more faculty members in 2003 who will further strengthen its program on aging, as well as its overall scholarship.

"In five to 10 years, I expect we will be nationally recognized for our work in AIDS, signaling processes, energy capture, and regulation of gene expression, as well as aging," Ruben says.

Unlike other universities that focus on hiring established scientists in mid-career, Ruben's goal is to hire young researchers who he thinks will be successful, and give them every opportunity to develop their careers.

"I'd like to nurture the next Nobel laureate," he says. ■

For more information: Larry Ruben
lruben@mail.smu.edu
www.smu.edu/biology

sponsored research

COMPILED BY LARRY SMITH, DIRECTOR OF RESEARCH ADMINISTRATION AND TECHNOLOGY MANAGEMENT

In fiscal year 2001-2002, SMU received \$11,010,791 for direct and indirect costs of research and sponsored projects. A total of 117 awards were made to 70 principal and co-principal investigators.

Funding sources were: federal agencies, \$7,079,042 (64.29 percent); corporations, \$760,917 (6.91 percent); foundations, \$1,280,516 (11.63 percent); state and local government agencies, \$1,865,818 (16.97 percent); and miscellaneous, \$24,498 (0.22 percent).

Dedman College received \$6,543,655 in 64 awards and the School of Engineering received \$3,233,955 in 42 awards. Cox School of Business, Meadows School of the Arts, and Perkins School of Theology each received one award, with Cox receiving \$143,472, Meadows receiving \$15,000, and Perkins receiving \$342,953. Nonacademic departments reporting to the Provost's Office received eight awards for a total of \$731,756.

Of the 70 project directors/investigators, 37 received \$100,000 or more in aggregate funding as principal or co-principal investigator. These investigators, in alphabetical order, are:

Diane Berry, Psychology, "Exploring the Interpersonal Component of Affectivity," National Institutes of Health (NIH).

David Blackwell, Geological Sciences, "Geothermal Resource Analysis and Structure of Basin and Range Systems, Especially Dixie Valley Geothermal Field, Nevada," Department of Energy; "Aquifer Temperature Variations and Implications for Aquifer Geometry and Flow Characteristics," Bechtel BWXT Idaho, LLC (BBWI).

Caroline Brettell, Anthropology; **Dennis Cordell**, History; and **James Hollifield**, Political Science, "Immigrants, Rights, and Incorporation in a Suburban Metropolis," NSF.

Jerome Butler, Electrical Engineering, "RF Gyro System Design and Experiments," C.S. Draper Laboratory, Inc.; "Efficient Monolithic WDM Components @ 1550 nm," Texas Higher Education Coordinating Board.

John Buynak, Chemistry, "Antibiotics Designed to Defeat Resistant Organisms," Texas Higher Education Coordinating Board; "Broad Spectrum Beta-Lactamase Inhibitors," AlamX Pharmaceutical; "Rational and Combinatorial Approaches to

Protease Inhibition," Welch Foundation.

Zeynep Celik-Butler, Electrical Engineering, "Research on Thermal Annealing of Si3N4 Thin Films for Investigation of Charging in MEMS Switches," Raytheon Co.; "Measurements and Modeling of Noise in Advanced Bipolar Technologies," Semiconductor Research Corp.; "Compact, Scalable Computer Models for Noise in Advanced CMOS and Bipolar Technologies," Texas Higher Education Coordinating Board.

Thomas Chen, Electrical Engineering, "Quality of Service in Internet 2," Alcatel USA; "Measurement-Based Traffic Characterization and Resource Allocation," NSF.

Zhangxin Chen, Mathematics, "Innovative Finite Element Methods for Modeling Multiphase Contaminant Flows in Porous Media," Texas Engineering Experiment Station (NSF subcontract); "New Developments for Reservoir Simulations," PDVSA-Intevp.

George Chrisman, Information Technology Services, "Telecommunications Infrastructure Fund Board (TIFB) HE3 Grant," TIFB.

Thomas Edwards, Teacher Preparation, "Upward Bound," Department of Education; "Upward Bound Supplement," Department of Education.

Hesham El-Rewini, Computer Science and Engineering, "On the Design and Operation of Mobile Computing and Communication Systems with Hybrid Backbones," Department of Defense.

Gary Evans, Electrical Engineering, "Laser Diode Packaging," Photodigm, Inc. (with Gemunu Happawana); "Grating Outcoupled Telecom Lasers," Photodigm, Inc.; "Commercialization of Low-Cost Surface-Emitting Semiconductor Lasers at 1310 and 1550 nm," Texas Higher Education Coordinating Board.

Jerry Gibson, Electrical Engineering, "Spectral Entropy and Adaptive, Lossy Source Coding," NSF.

Richard Helgason, Engineering Management, Information and Systems, "Maximizing Profitability of QoS-Based Packet-Switched Telecommunications Networks," Texas Higher Education Coordinating Board.

Steven Henning, Accounting, "IPA Agreement," Securities and Exchange Commission.

Eugene Herrin, Geological Sciences, "TXAR Operations Quote," U.S. Air Force; "Lajitas Transition Services," CACI Technologies, Inc.; "Operation and Maintenance of TXAR Array," U.S. Air Force.

Richard Jones, Biological Sciences, "Polycomb-Group Genes and Gene Regulation," NIH.

Jeffery Kennington and **Eli Olinick**, Engineering Management, Information and Systems, "Optimization-Based Techniques for Designing Optical Networks," U.S. Navy.

Radovan Kovacevic, Mechanical Engineering, "Research Experience for Teachers Supplement," NSF; "Combined Research-Curriculum Development: Nontraditional Manufacturing," Columbia University (NSF subcontract); "Development of Information System for Hybrid Rapid Manufacturing Process," Texas Higher Education Coordinating Board; "NSF Research Experience for Undergraduates - Stability Control of Weld Formation in Variable Polarity Plasma Arc Welding," NSF; "Research Experience for Undergraduates Supplement: Controlled Heat and Metal Transfer in Gas Metal Arc Welding - Base for New Rapid Prototyping Technique," NSF.

Choon Sae Lee, Electrical Engineering, "Compact Antenna System for Mobile Satellite Communication," Texas Higher Education Coordinating Board.

Robin Lovin, Theology, "Program to Enhance Theological Schools Capacities to Prepare Candidates for Congregational Ministry," Lilly Endowment Inc.

Michael McCullough, Psychology, "Forgiveness and Health: Development and Application of a Laboratory Paradigm," John Templeton Foundation/The Terman Spirituality and Health Project; "Perspectives and Dimensions of Gratitude," John Templeton Foundation.

William Orr, Biological Sciences, "Cellular Aging and Oxygen-Free Radicals," University of Southern California; "Protein Targets of Oxidative Damage During Aging," NIH; "Glutathione, Oxidative Stress, and Aging," NIH.

Connie Peters, Provost, "Learning Therapy Program," Texas Education Agency; "Learning Therapy Program," Head Start of Greater Dallas, Inc.; "Head Start Project," Texas Instruments Foundation.

William Pulte, Anthropology, "Bilingual Education - Professional Development," Department of Education.

Mary Queyrouze, Libraries, "SMU Libraries TIFB - LBS,"

Telecommunications
Infrastructure Fund Board
(TIFB).

Lawrence Ruben, Biological
Sciences, "Eicosanoic Acids in
Trypanosoma Brucei," NIH.

Carolyn Sargent and **Dennis Cordell**,
Anthropology, "Reproduction and
Representations of Family Among
Malian Migrants in Paris,
France," NSF.

David Son, Chemistry, "New
Inorganic/Organic Hybrid
Architectures Containing -SINSi-
Linkages - Dendrimers,
Hyperbranched Polymers, Stars,
and Cyclics," NSF; "Synthesis and
Modification of New Inorganic-
Organic Hybrid Hyperbranched
Polymers," Welch Foundation.

Ryszard Stroynowski and **Fredrick
Olness**, Physics, "High Energy
Physics - Theory," Department of
Energy.

Brian Stump, Geological Sciences,
"Calibration of Source and
Propagation Path Effects In and
Around the Korean Peninsula,"
Defense Threat Reduction Agency
(DTRA); "A Comparative Study of
Natural and Man-Induced
Seismicity in the Yanqing-Huailai
Basin and the Haicheng Area,
China," DTRA.

Vigdor Teplitz, Physics, "Intera-
gency Personnel Agreement,"
Office of Science and Technology
Policy.

Jeff Tian, Computer Science and
Engineering, "CAREER:
Techniques and Tools for Early
Measurement and Improvement
of Software Reliability," NSF
(with Nortel Industry Match); "A
Word Sense Disambiguation
Algorithm for a Distributed Java
Virtual Machine," NSF; "Ensuring
and Maximizing Reliability and
Safety for Embedded Software
Systems," Texas Higher
Education Coordinating Board.

Steven Vik, Biological Sciences,
"Structure/Function Studies of
E. coli F1 F0 ATPase," NIH;
"Chemical Proteolysis and Cross-
Linking of Membrane Proteins,"
Welch Foundation.

Fred Wendorf, Anthropology,
"Archaeological Techniques in
Pre-Historic Saharan Excavation
Program," American Research
Center in Egypt, Inc.

Patty Wisian-Neilson, Chemistry,
"Micromachined Infrared Sensors
on Flexible Substrates," NSF;
"Studies of Grafts and Blends of
Poly (alkyl/arylphosphazenes) with
Organic and Inorganic Polymers,"
NSF; "Cyclic Alkyl/Aryl
Substituted Phosphazenes:
Control of Molecular Shape,"
Welch Foundation.

Crayton Yapp, Geological Sciences,
"Ancient Atmospheric Carbon
Dioxide, Paleoclimates, and the
Stable Isotope Geochemistry of
Low Temperature Iron (III)
Oxides," NSF.

Foundation to Help SMU Commercialize Promising Research

Because of a growing portfolio of potentially viable
technologies, SMU has established a new legal
entity to help it commercialize promising research.

The new SMU Foundation for Research will help the
University identify promising faculty inventions, patent
and market faculty inventions accepted for commercial-
ization, and seek partnerships and capital to develop
SMU inventions.

"In the past seven or eight years our technology
transfer program has grown to the point where we need
to take it to the next level," says U. Narayan Bhat, dean
of research and graduate studies. "The SMU Foundation
for Research will be able to more effectively manage
SMU's portfolio of intellectual property."

The foundation will be led by an internal board of
directors as well as an external advisory board.

For more information: **Narayan Bhat**

214-768-3268

nbhat@mail.smu.edu

Incubating Geoscience Research

Some budding oil and gas industry entrepreneurs are
putting vacant space at the SMU-in-Legacy facility
to good use.

The entrepreneurs have signed an agreement with
SMU to use space in the Plano facility to set up an "incu-
bator" for new businesses. To date, five companies have
joined the incubator, called the Geoscience and Energy
Research Lab.

The incubator is a "win-win" situation for both them
and SMU, the entrepreneurs say, because the companies
benefit from the proximity to each other and from access
to SMU's geological sciences professors. SMU geological
science students benefit from the opportunity to work for
the start-up companies, either as interns or after they
graduate.

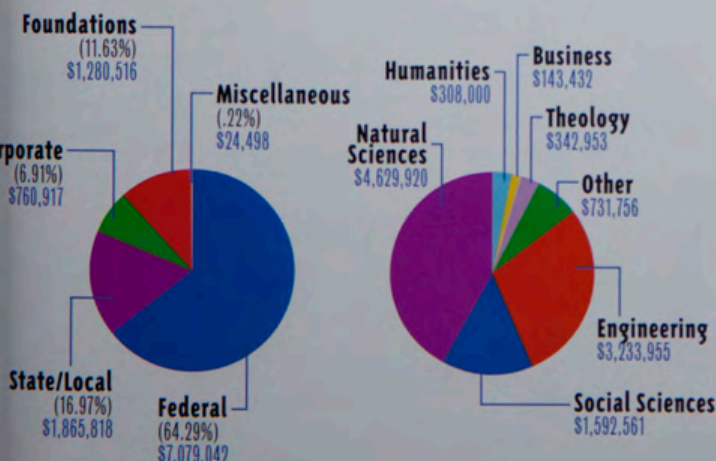
Space is still available in the incubator. Entrepre-
neurs who work out of their homes can join the incuba-
tor as associates and use the space for meetings.

For more information: **Bonnie Jay**
bonniejay@innexenergy.com

FUNDING SOURCES IN 2002

\$11,010,791 TOTAL

DISTRIBUTION OF AWARDS



note-worthy

New Program Funds Faculty Research Fellowships

A \$1 million pledge from Gerald J. Ford of Dallas, alumnus and chair of the SMU Board of Trustees, has established a research fellowship program that will help SMU continue to attract and retain outstanding faculty members.

The new program comprises the Gerald J. Ford Early Career Research Fellowships and the Gerald J. Ford Research Fellowships.

The Ford Early Career Research Fellowships will enable SMU to offer young scholars the additional incentive of summer research grants or regular semester research support to help establish their research programs. Up to four newly appointed faculty members at a time will hold these fellowships, which will provide each recipient at least \$10,000 a year for two years.

The Ford Research Fellowships will be available to continuing faculty members on a competitive basis. They will help the University retain and reward outstanding research scholars by providing summer stipends of \$15,000 each for up to four faculty members each year. The first Ford Research Fellows will be appointed in summer 2003.

Two Anthropology Students Receive NSF Graduate Fellowships

Two SMU anthropology doctoral students have received three-year research fellowships from the National Science Foundation to study anthropology. Michelle Rich and Catrina Whitely have received fellowships that carry a stipend of \$21,500 per year and cover the full tuition cost at SMU.

Rich is working on her Ph.D. in archaeology under the direction of David Freidel, focusing on Mayan culture. She also received a \$1,000 travel grant from the NSF, which will be used for her dissertation work in Guatemala.

Whitely is working on her Ph.D. in archaeology under the direction of Michael Adler, focusing on human skeletal remains and burial practices in the Southwest.

Stimulating Science Conversations

Dallas-area residents can learn more about the research of SMU professors and other leading scientists by participating in the Collegium da Vinci lecture series sponsored by SMU's Dedman College.

Collegium da Vinci allows a limited number of participants to meet and hear some of today's leading scientists in a small setting. Dinners and lectures are held monthly on Sunday evenings October through April.

"Collegium da Vinci is the most stimulating, challenging conversation about science in Dallas," says Jasper Neel, dean of Dedman College.

Collegium da Vinci limits its series memberships to 30. Tickets for individual lectures also may be purchased. For more information on Collegium da Vinci, call 214-768-2103. Membership in Collegium da Vinci supports science programs in SMU's Dedman College.

Engineering: A 50-50 Proposition

The SMU School of Engineering has announced a new initiative designed to make it the first engineering school in the country to reach an equal enrollment of male and female students. The school plans to reach gender parity within five years by developing innovative programs that will interest a broad range of students.

"Medical and law schools have already reached gender parity, so why not engineering schools?" says Stephen Szygenda, dean of the SMU School of Engineering. SMU is the ideal location to become the first engineering school in the nation with gender parity, Szygenda says, because it already has nearly 30 percent female students, one of the highest percentages of female enrollment in the country.

Betsy Willis, director of student programs and outreach for the SMU School of Engineering, is leading the new initiative. The School plans to further enhance its curriculum by adding new classes that combine engineering and the arts, Willis says. It also will offer service learning courses that allow students to apply engineering skills earlier in their academic careers, and will encourage engineering students to participate in alternative spring break projects in which they can use their skills to help society.

"Women are very interested in the service component of engineering," Willis says. "Curriculum enhancements such as service learning courses and alternative spring break will let students see how their engineering skills can impact people's lives."

For more information: Betsy Willis
bwillis@engr.smu.edu

Music Laureates

Sayako Kusaka, a student at SMU's Meadows School of the Arts, won first prize in the 21st Rodolfo Lipizer International Violin Competition held in Gorizia, Italy. Kusaka also won six special prizes – the maximum for which she was eligible – including awards for best performances of Bach, Mozart, contemporary compositions, and more.

The top prize in the competition, which is considered one of the most prestigious in the world, was awarded by a distinguished seven-member international jury. It includes an award of \$8,000 and a medal from the president of Italy.

Kusaka is a student of Eduard Schmieder, the Algor H. Meadows Distinguished Professor of Violin and Chamber Music at SMU and a renowned concert violinist. Another of Schmieder's students, Vadim Tchijik, placed fifth in the Lipizer competition and was offered a teaching appointment at the Paris Conservatory.

Kusaka is one of 17 of Schmieder's students who have been prizewinners and laureates at major international violin competitions within the past decade, including the Queen Elizabeth, Premio Paganini, and Jacques Thibaud International Violin Competitions.

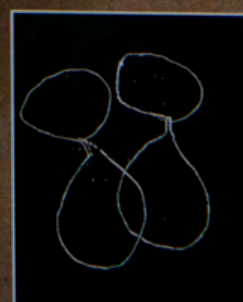
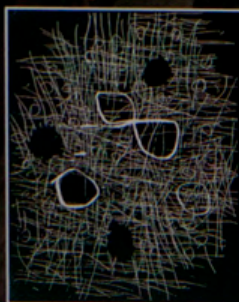
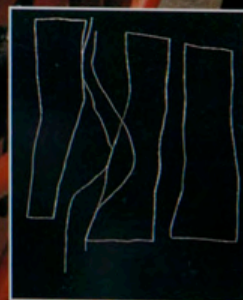
The new Jerry R. Junkins Electrical
Engineering Building, which
opened in August 2002, symbolizes
SMU's commitment to expanding
its engineering programs.



portrait of an artist

For Laurence Scholder, print-making is the medium that best represents what he calls "the language of my discourse" – the line. "The line can depict a form from nature, divide figure from ground, indicate size and direction, record nuances of weight, or graph a system of proportion removed from any form of representation. It is through the accumulation and collision of the lines that I find what the work is going to become," he says. Normally Scholder works with intaglio prints, in which the images are printed black on white from a recessed design etched into the surface of a plate. His most recent works are etchings printed in relief, in which the linear elements appear as white on black. "An unintended consequence of printing the plates in relief is the way the various elements in the plate are seamlessly merged in a homogeneous surface," he says. Scholder's etchings have been displayed in numerous solo and group exhibitions and can be found in public collections. The professor of art has taught at SMU since 1968. He earned his M.A. from the University of Iowa.

TOP: Afar, 1993
MIDDLE: Twixt, 2001
BOTTOM LEFT: Whirl, 1999
BOTTOM RIGHT: Duple, 2001





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214-768-4345, or E-mail

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